IN THE CLAIMS:

The following claims are pending:

1. (Previously presented) A method of monitoring machining in an electrochemical machining tool assembly having at least one electrode arranged across a gap from a workpiece, the electrode being energized by application of a potential difference ΔV between the electrode and the workpiece, said method comprising:

exciting at least one ultrasonic sensor to direct an ultrasonic wave toward a surface of the electrode;

receiving a reflected ultrasonic wave from the surface of the electrode using the ultrasonic sensor, the reflected ultrasonic wave comprising a plurality of reflected waves from the surface of the electrode and from a surface of the workpiece; and

synchronizing the excitation of the ultrasonic sensor to a machining cycle of the electrochemical machining tool, the synchronizing comprising delaying the excitation of the ultrasonic sensor a dwell time T_d after a reduction of the potential difference ΔV across the electrode and the workpiece occurs, such that the exciting and receiving are performed during a plurality of machining off-times.

2. (Original) The method of Claim 1, wherein the electrochemical machining tool assembly is a pulsed electrochemical machining tool assembly, and wherein the electrode is energized by a periodic application of the potential difference ΔV between the electrode and the workpiece during a plurality of pulse-on periods, and wherein the delaying comprises delaying the excitation of the ultrasonic sensor the dwell time T_d after a transition from the pulse-on state to a pulse-off state.

3. (Previously presented) The method of Claim 1, wherein the electrochemical machining tool assembly is a continuous electrochemical machining tool assembly, said method further comprising:

repeatedly reducing the potential difference ΔV across the electrode and the workpiece to generate a series of measurement periods Δt_M,

wherein the synchronizing comprises delaying the excitation of the ultrasonic sensor a dwell time T_d after a start of one of the measurement periods Δt_M.

4. (Original) The method of Claim 1, wherein the dwell time T_d is in a range of about seven milliseconds (7 ms) to about 15 milliseconds (15 ms).

5. (Original) The method of Claim 1, further comprising adjusting the dwell time T_d.

6. (Original) The method of Claim 5, wherein the adjusting comprises decreasing the dwell time T_d.

7. (Original) The method of Claim 5, wherein the adjusting comprises increasing the dwell time T_d.

8. (Original) The method of Claim 1, wherein the electrochemical machining tool assembly has at least two electrodes, each of the electrodes being arranged across a respective gap from the workpiece.

9. (Original) The method of Claim 8, wherein the exciting comprises exciting a first ultrasonic sensor to direct an ultrasonic wave toward a surface of one of the electrodes and exciting a second ultrasonic sensor to direct an ultrasonic wave toward a surface of another of the electrodes,

wherein the receiving comprises receiving respective reflected ultrasonic waves from the surface of each of the respective electrodes using the respective ultrasonic sensors, and

wherein the delaying comprises delaying the excitation of a first one of the ultrasonic sensors the dwell time T_d after a reduction of the potential difference ΔV across the electrodes and the workpiece occurs and delaying the excitation of the other of the

ultrasonic sensors the dwell time T_d plus an offset δ after a reduction of the potential difference ΔV across the electrodes and the workpiece occurs, where the offset δ is at least the time required to attenuate the ultrasonic wave from the first one of the ultrasonic sensors.

10. (Original) The method of Claim 1, further comprising analyzing the reflected ultrasonic wave to determine at least one of (a) a size of the gap between the electrode and the workpiece and (b) a thickness of the workpiece.

11. (Original) The method of Claim 1, wherein the ultrasonic sensor comprises an ultrasonic transducer.

12. (Previously presented) A method of monitoring machining in a pulsed electrochemical machining tool assembly having at least one electrode arranged across a gap from a workpiece, the electrode being periodically energized by application of a plurality of pulses, said method comprising:

exciting at least one ultrasonic sensor to direct an ultrasonic wave toward a surface of the electrode;

receiving a reflected ultrasonic wave from the surface of the electrode using the ultrasonic sensor, the reflected ultrasonic wave comprising a plurality of reflected waves from the surface of the electrode and from the surface of the workpiece; and

synchronizing the excitation of the ultrasonic sensor to a machining cycle of the electrochemical machining tool, the synchronizing comprising delaying the excitation of the ultrasonic sensor a dwell time T_d after a transition from a pulse-on state to a pulse-off state, such that the exciting and receiving are performed during a plurality of machining off-times.

13. (Original) The method of Claim 12, further comprising adjusting the dwell time T_d.

14. (Original) The method of Claim 12, wherein the dwell time T_d is in a range of about seven milliseconds (7 ms) to about 15 milliseconds (15 ms).

15. (Previously presented) An electrochemical machining method for machining a workpiece comprising:

energizing at least one electrode positioned in proximity to the workpiece, the electrode and the workpiece being separated by a gap;

flowing an electrolyte through the gap;

flushing the electrolyte from the gap;

feeding the at least one electrode toward the workpiece; and

monitoring at least one of the gap and the workpiece using at least one ultrasonic sensor, the monitoring comprising:

exciting the ultrasonic sensor to direct an ultrasonic wave toward a surface of the electrode,

receiving a reflected ultrasonic wave from the surface of the electrode using the ultrasonic sensor, the reflected ultrasonic wave comprising a plurality of reflected waves from the surface of the electrode and from the surface of the workpiece, and

synchronizing the excitation of the ultrasonic sensor to a machining cycle of the electrochemical machining tool, the synchronizing comprising delaying the excitation of the ultrasonic sensor a dwell time T_d after a reduction of the potential difference ΔV across the electrode and the workpiece occurs, such that the exciting and receiving are performed during a plurality of machining off-times.

16. (Original) The method of Claim 15, wherein the monitoring further comprises adjusting the dwell time T_d.

17. (Original) The method of Claim 15, wherein the dwell time T_d is in a range of about seven milliseconds (7 ms) to about 15 milliseconds (15 ms).

18. (Original) The method of Claim 15, wherein the electrochemical machining tool assembly is a pulsed electrochemical machining tool assembly, and wherein the energizing comprises a periodic application of the potential difference ΔV between the electrode and the workpiece during a plurality of pulse-on periods, and wherein the delaying comprises delaying the excitation of the ultrasonic sensor the dwell time T_d after a transition from the pulse-on state to a pulse-off state.

19. (Original) The method of Claim 15, wherein the electrochemical machining tool assembly is a continuous electrochemical machining tool assembly, said method further comprising:

repeatedly reducing the potential difference ΔV across the electrode and the workpiece to generate a series of measurement periods Δt_M,

wherein the delaying comprises delaying the excitation of the ultrasonic sensor the dwell time T_d after a start of one of the measurement periods Δt_M.

20. (Original) The method of Claim 15, wherein the monitoring further comprises generating monitoring data by analyzing the reflected ultrasonic wave to determine at least one of (a) a size of the gap between the electrode and the workpiece and (b) a thickness of the workpiece.

21. (Original) The method of Claim 20, further comprising controlling at least one of the energizing and the feeding in response to the monitoring data.

22-31. (Cancelled)